

525 Rec'd PCT/PTO 05 JAN 2007

Form PTO-1390 U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE (REV 10-95)		ATTORNEY'S DOCKET NUMBER <b>3135-010012</b>
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U S APPLICATION NO. (If known, see 37 CFR 1.5) <b>09/743155</b>
INTERNATIONAL APPLICATION NO <b>PCT/NL99/00424</b>	INTERNATIONAL FILING DATE <b>05.07.99 (July 05, 1999)</b>	PRIORITY DATES CLAIMED <b>06.07.98 (July 06, 1998)</b>
TITLE OF INVENTION <b>MOULD, ENCAPSULATING DEVICE AND METHOD OF ENCAPSULATION</b>		
APPLICANT(S) FOR DO/EO/US <b>Marcel Gerardus Antonius TOMASSEN and Antonius Bernardus CLAASSEN</b>		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information		
<p>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371</p> <p>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371</p> <p>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1)</p> <p>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau)</p> <p style="margin-left: 20px;">b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau</p> <p style="margin-left: 20px;">c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2))</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau)</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> have been transmitted by the International Bureau</p> <p style="margin-left: 20px;">c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired</p> <p style="margin-left: 20px;">d. <input checked="" type="checkbox"/> have not been made and will not be made</p> <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))</p> <p>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5))</p> <p><b>Items 11. to 16. below concern document(s) or information included:</b></p> <p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment together with retyped specification pages 1-3a</p> <p style="margin-left: 20px;"><input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment</p> <p>14. <input type="checkbox"/> A substitute specification</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter</p> <p>16. <input checked="" type="checkbox"/> Other items or information:</p> <p style="margin-left: 20px;">a. WO 00/02242-Front Page with Abstract, Specification, Claims, Drawings and Search Report (14 pp.)</p> <p style="margin-left: 20px;">b. International Preliminary Examination Report and Annex (14 pp.)</p>		

500 Rec'd PCT/PTO 0 5 JAN 2001

U.S. APPLICATION NO. (If known, see 37 CFR 1.51) <div style="font-size: 1.5em; font-weight: bold;">09/743155</div>	INTERNATIONAL APPLICATION NO PCT/NL99/00424	ATTORNEY'S DOCKET NUMBER 3135-010012			
17. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):</b> Search Report has been prepared by the EPO or JPO..... \$860.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) ..... \$690.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ..... \$710.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... \$1,000.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)..... \$100.00 <div style="text-align: right; font-weight: bold;">ENTER APPROPRIATE BASIC FEE AMOUNT =</div>		CALCULATIONS PTO USE ONLY <div style="border: 1px solid black; height: 100px; width: 100%;"></div>			
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e))		\$ 860.00 \$ 130.00			
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	8 - 20	0	X \$18.00	\$ 0.00	
Independent claims	3 - 3 =	0	X \$78.00	\$ 0.00	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$260.00	\$ 0.00	
TOTAL OF ABOVE CALCULATIONS =				\$ 990.00	
Reduction of 1/2 for filing by small entity, if applicable Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28)				\$ 0.00	
SUBTOTAL =				\$ 990.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f))				\$ 0.00	
TOTAL NATIONAL FEE =				\$ 990.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)) The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) \$40.00 per property				\$ 0.00	
TOTAL FEES ENCLOSED =				\$ 990.00	
				Amount to be: refunded	\$
				charged	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>990.00</u> to cover the above fees is enclosed b. <input type="checkbox"/> Please charge my Deposit Account No _____ in the amount of \$ _____ to cover the above fees A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Assistant Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No <u>23-0650</u> A duplicate copy of this sheet is enclosed. <p><b>NOTE:</b> Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 60%;">           SEND ALL CORRESPONDENCE TO            John W. McIlvaine            700 Koppers Building            436 Seventh Avenue            Pittsburgh, Pennsylvania 15219-1818            Telephone: (412) 471-8815            Facsimile: (412) 471-4094         </div> <div style="width: 35%; text-align: center;">             SIGNATURE            John W. McIlvaine            NAME            34,219            REGISTRATION NUMBER         </div> </div>					

09/743155  
500 Rec'd PCT/PTO 0 5 JAN 2001

PATENT APPLICATION/PCT  
Attorney Docket 3135-010012

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of :  
  
**Marcel Gerardus Antonius TOMASSEN** : **MOULD, ENCAPSULATING**  
**and Antonius Bernardus CLAASSEN** : **DEVICE AND METHOD OF**  
: **ENCAPSULATION**  
International Application :  
No. PCT/NL99/00424 :  
  
International Filing Date :  
05 July 1999 :  
  
Priority Date Claimed :  
06 July 1998 :  
  
Serial No. Not Yet Assigned :  
  
Filed Concurrently Herewith :

Pittsburgh, Pennsylvania

January 5, 2001

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington DC 20231

Sir:

Prior to initial examination, please amend the above-identified patent application  
as follows:

**IN THE SPECIFICATION:**

Original specification pages 1-6 were amended during Chapter II proceedings in  
a letter dated July 7, 2000. The following further amendments are being made to simply  
conform the application to standard United States Patent practice.

Amended page 1, after the title and at line 2, insert the following headings:

**--BACKGROUND OF THE INVENTION**

**1. Field of the Invention--.**

Amended page 1, line 4, delete ", according to preamble of claim 1".

Amended page 1, line 5, delete "according the preamble of claim 6".

Amended page 1, line 12, insert the following heading:

**--2. Description of the Prior Art--.**

Amended page 2, line 9, insert the following heading:

**--SUMMARY OF THE INVENTION--.**

Amended page 2, line 10, delete "according claim 1".

Amended page 3, line 28, delete "according claim 6".

Amended page 4, line 4, change "Tis" to read --This--.

Amended page 4, line 17, delete "according claim 7".

Amended page 4, line 19, after "Preferably" insert a comma (,).

Amended page 4, line 19, delete "is".

Amended page 4, line 20, before "applied" insert --is--.

Amended page 4, line 28, insert the following heading:

**--BRIEF DESCRIPTION OF THE DRAWING--.**

Amended page 5, before line 1, insert the following heading:

**--DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--.**

**IN THE CLAIMS:**

Please cancel original claims 1-12 and cancel amended claims 1-8. Amended claims 1-8 have been rewritten as claims 13-20 as follows:



18. An encapsulating device for encapsulating electronic components mounted on a carrier, comprising:

a mould as claimed in claim 13,

drive means for positioning and causing the mould parts to move relative to each

5 other,

feed means for encapsulating material, and

a fan connecting onto the side of the runner remote from the mould cavity, wherein the fan is adapted to blow gases into the runner and to extract gases from the runner.

19. A method for encapsulating electronic components mounted on a carrier, using a mould defining a mould cavity and a runner connecting onto a wall co-defining the mould cavity, comprising the steps of:

A) positioning at least one carrier relative to a lower mould part,

5 B) closing the mould by moving the lower mould part and an upper mould part towards each other,

C) feeding encapsulating material to the part of the mould cavity left clear by the carrier, and

D) opening the upper and lower mould parts and removing the carrier with  
10 encapsulating material arranged thereon, wherein during step D) an overpressure is applied in the runner which overpressure releases the encapsulated electronic components from the lower mould part.

20. The method for encapsulating electronic components according to claim 19, wherein after step A) during step B) an underpressure is applied in the runner, whereby the carrier is sucked to the lower mould part.--

**IN THE ABSTRACT:**

After the claims, please insert a page containing the Abstract Of The Disclosure, which is attached hereto as a separately typed page.

**REMARKS**

The specification has been amended by this Preliminary Amendment to place the application in conformance with standard United States Patent practice.

Original claims 1-12 have been cancelled and amended claims 1-8 have been cancelled and rewritten as claims 13-20 in order to eliminate the multiple dependencies and to conform the claims to standard United States patent practice. Claims 1-8, inserted in the application during Chapter II proceedings, have been cancelled in favor of new claims 13-20. Claims 1-8 were not cancelled for the purpose of overcoming prior art or to correct any perceived deficiencies in the claims with respect to 35 U.S.C. §112. Rather, claims 1-8 were cancelled simply to facilitate removal of reference numerals from the claims and to eliminate multiple dependencies.


An Abstract Of The Disclosure has been added as a separately typed page to be inserted after the claims.

Examination and allowance of claims 13-20 are respectfully requested.

Respectfully submitted,

WEBB ZIESENHEIM LOGSDON  
ORKIN & HANSON, P.C.

By



John W. McIlvaine, Reg. No. 34,219  
Attorney for Applicants  
700 Koppers Building  
436 Seventh Avenue  
Pittsburgh, PA 15219-1818  
Telephone: 412/471-8815  
Facsimile: 412/471-4094

The invention relates to a mould for encapsulating electronic components mounted on a carrier, comprising: at least two mould parts displaceable relative to each other, at least one of which is provided with a recess, and feed means for encapsulating material, wherein at least one of the mould parts is provided with a runner which connects on one side to a wall of a mould part co-defining a mould cavity and connects on the other side to a side of the mould part remote from the mould cavity. The invention also relates to an encapsulating device of which such a mould forms parts, and to a method for encapsulating electronic components mounted on a carrier.



11 10 05 09/743155  
500 Rec'd PCT/PTO 05 JAN 2001

Mould, encapsulating device and method of encapsulation

The invention relates to a mould for encapsulating electronic components mounted on a carrier, according the preamble of claim 1. The invention also relates to an encapsulating device according the preamble of claim 6. Finally, the invention also relates to a method for encapsulating electronic components mounted on a carrier.

Such a mould, encapsulating device and method form known art with which, using for instance epoxy resin, a package of encapsulating material can be applied round an electronic component arranged on a carrier. This technique is used particularly for encapsulating semiconductor products, such as for instance chips.

The European patent application EP 0 730 937 discloses a resin moulding machine with release film. The machine is provided with a mechanism that fixes release film on inner faces of the moulding sections and clamping faces. Also disclosed are air sucking holes in the upper die to hold substrates in the upper die. The loading of substrates in the machine with air sucking holes in the upper die takes a lot of time. The apparatus is also not suited for lead frames with wire bounded electronic components.

There is a tendency in the market towards arranging packages of encapsulating material on a carrier which are increasingly larger in terms of surface area. During further processing these can be for instance sawn into separate parts. This technique is also known as "C.S.P.", which is derived from "chip size packaging". The existing moulds and methods have the drawback that when the mould parts are closed a part of the electronic components can come into contact with a mould part. This can for instance cause damage to the components and/or contact wires ("leads") can be deformed. This is the particular consequence of a carrier not being completely flat when it is placed in a mould. Particularly carriers on which larger packages of encapsulating material must be arranged so that a plurality of electronic components can be moulded simultaneously with one package have such a three-dimensional form. The reason for this is that these carriers are in general thermally treated at many

10-07-00

2 Amended application PCT/NL99/00424  
as filed with letter dated July 7, 2000

points during placing of the electronic components. This results in stresses in the carrier which, when it is placed in a mould, can result in the carrier not being completely flat. As described above, this results in possible damage to the electronic components and/or connecting wires.

5

The present invention has for its object to provide an improved mould, encapsulating device and method for encapsulating electronic components mounted on a carrier, with which damage to electronic components and contact wires can be prevented.

- 10 The invention provides for this purpose a mould according claim 1. With such a mould a carrier can be placed on a simple way on the lower mould part and sucked against the lower mould part before closing of the mould. An important advantage over the prior art is that the carrier is easier to place on a bottom wall of the lower mould part than in an upper mould part. As of the number of apertures in
- 15 the mould the carrier lies more or less flat against the lower mould part. The force of gravity thus co-acts with the suction through the runner, which makes it easier to position the carrier more or less flat. Thus is prevented that, when the mould is closed, electronic components and/or contact wires come into contact with a counter-mould part because the carrier is not flat. Especially where contact of components
- 20 with the upper mould can occur, on positions opposite the recess in the upper mould, the carrier is due to the location of the apertures to be sucked to the lower mould. Avoiding this contact means that damage to electronic components and/or contact wires is prevented. The number of apertures onto which runners connect makes that the carrier can be placed in flat position on a mould part with
- 25 great precision. This increases the reliability of the mould. In a preferred embodiment a plurality of runners connecting onto the wall co-defining the mould cavity are in mutual communication and are connected to a single runner which connects onto a side of the mould part remote from the mould cavity. By extracting gases through a single runner it can thus be achieved that the carrier is adhered by suction at a
- 30 plurality of positions. A mould with great reliability can thus be realized with a simple suction.

AMENDED SHEET

10-07-00

3 Amended application PCT/NL99/00424  
as filed with letter dated July 7, 2000

The Japanese patent JP 06 021130 discloses a moulding apparatus for mounting parts carrying semiconductor chips. The bottom of a cavity of a lower metal mould has a sucking hole C to prevent deviation of the mounting part in lateral direction and to improve the yield rate. This apparatus is only suited for  
5 processing special products with a tip part that is held between a lower and an upper mould and a mounting part that is located below the tip part. As the apparatus possesses only one sucking hole the apparatus is also not suited for placing a mounting part in a flat position when the mounting part was deformed before processing in the apparatus.

10

The runner preferably debouches in a wall defining a mould cavity, which wall is screened from the feed opening for encapsulating material by the carrier when encapsulating material is fed to the mould. In order to prevent encapsulating material entering the runner, the runner and feed opening for encapsulating material must be  
15 placed relative to each other such that during the encapsulating they are mutually separated by a carrier. It is noted here that it is recommended that the wall defining a mould cavity is formed by the bottom of the lower mould part.

In yet another preferred embodiment the lower mould is also provided with at least one aligning edge for positioning a carrier relative to the mould part. Since it can be  
20 difficult to displace a carrier again relative to a mould part once the former has been adhered by suction by the runner, it is recommended to first place the carrier at the correct position and then to activate the suction action by means of the runner. Another option is to activate the suction action of the runner immediately on placing,  
25 and in this case it is recommended to place the carrier directly at the correct position in the mould part. The aligning edge is also useful here.

The invention also comprises an encapsulating device according claim 6. For suction of the carrier by means of the runner it is necessary for an underpressure to be applied  
30 in the runner. This is realized by means of the fan which extracts gases. A carrier can thus also remain sucked against a mould part when the mould is opened, whereby the carrier with encapsulating material can be "pulled loose" from an opposite mould part.

AMENDED SHEET

10.07.00

4 Amended application PCT/NL99/00424  
as filed with letter dated July 7, 2000

This opposite mould part (for instance the top mould) can thus be embodied without ejector pins, which makes the construction of the upper mould more simple. The facility of blowing gases into the runner makes that an overpressure in the runner can be realised. This makes it possible to exert a force on the carrier with  
5 such that the carrier is released from the lower mould part. It is thus possible to embody the mould in simplified manner compared to the moulds applied in the prior art. These after all employ ejector pins for pressing a carrier out of the mould after applying of the encapsulating material. It will be apparent that a mould incorporating a number of ejector pins has an emphatically more complex structure than a mould in  
10 which these can be omitted or arranged in more limited number. An additional advantage of blowing gases into the runner is that in this manner the runner can be cleaned of possible contaminants. It is thus also recommended to apply at least limited over-pressure in the runner during cleaning of the mould so that no contaminants can be brushed or otherwise carried into the runner.

15 The invention also relates to a method for encapsulating electronic components according claim 7. By means of this method the carrier can be placed in close-fitting connection against a wall of a mould part before the mould is closed. This results in the advantages as already described above. Preferably is after step A) during a step  
20 B) an under-pressure applied in the runner (9), whereby the carrier is sucked to lower mould part (3). By means of this method the carrier can be placed in close-fitting connection against a wall of a mould part before the mould is closed. This results in the advantages as already described above. With this method two advantages as described above are combined. That is, the carrier can be  
25 arranged close-fittingly in a mould part and, after the encapsulating process, the carrier will be released from the relevant mould part by overpressure in the runner. The advantages of both methods are hereby also combined.

30 The present invention will be further elucidated with reference to the non-limitative embodiment shown herein below. The figure shows a view of a schematic three-dimensional representation of a mould according to the invention in partly exploded situation.

AMENDED SHEET

10-07-00

5 Amended application PCT/NL99/00424  
as filed with letter dated July 7, 2000

5 The figure shows a mould 1 consisting of an upper mould part 2 and a lower mould part 3. Lower mould part 3 is provided with a central beam 4 in which recesses 5 are arranged for placing pellets of encapsulating material. Also situated in central beam 4 in each recess 5 are plungers (not shown) with which pressure can be applied to the encapsulating material.

Support plates 6,7 are arranged on either side of central beam 4. Support plate 7 is shown in a detached position while support plate 6 is shown in an assembled position. Support plates 6,7 are provided with a large number of apertures 8 which are placed together in groups. These apertures 8 connect onto runners 9 which run through support plates 6,7 and which are only shown for a few of the apertures 8 by means of broken lines. These runners 9 connect onto tracks 10 arranged in a base block 11. Base blocks 11 are adapted to bear support plates 6,7. Each base block 11 is provided with an internal bore 12 which connects onto tracks 10. Base blocks 11 are each provided with an outlet 13 of the bores 12. By now connecting a fan (not shown) onto each outlet 13, air can be drawn in through bore 12, tracks 10, runners 9 and finally apertures 8. The suction of air through apertures 8 can be utilized to place carriers such as for instance lead frames or B.G.A.'s in flat position on the support plates 6,7. It is also possible to release carriers from support plates 6,7 by increasing the pressure close to the outlet 13. This increased pressure will be transmitted to the apertures 8, which at least simplifies release of the carriers.

It is noted that the groups of apertures 8 are placed such that in terms of shape they correspond with the shape of the spaces 14 which are left clear in the contact side 15 of the upper mould part 2. These spaces 14 will be filled with encapsulating material, which implies that the carriers will contain electronic components precisely at that position where spaces 14 are situated. It is therefore important that the carrier is in flat position particularly at these positions. It is for this reason that the apertures 8 are arranged at precisely these positions.

30 Although the invention is elucidated with reference to only a single embodiment, it will be apparent to all that the invention is in no way limited to the described and shown embodiment. On the contrary, many more variations are possible for the

AMENDED SHEET

10-07-2000

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6 Amended application PCT/NL99/00424  
as filed with letter dated July 7, 2000

skilled person within the scope of the invention. It is thus possible for instance to arrange apertures 8 also, or only, in the upper mould part 2, whereby release of a carrier provided with encapsulating material can be realized by applying an overpressure on apertures 8. In addition, there are numerous possible variations in respect of the number and positions of apertures 8.

AMENDED SHEET

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7 Amended application PCT/NL99/00424  
as filed with letter dated July 7, 2000

# Claims

1.     Mould (1) for encapsulating electronic components mounted on a carrier,  
comprising:
  - 5     - at least two mould parts (2,3) displaceable relative to each other, at least one of  
which is provided with a recess (5), and
  - feed means for encapsulating material,  
wherein at least one of the mould parts (2,3) is provided with a suction runner (9)  
which connects on one side to a wall of a mould part (2,3) co-defining a mould cavity  
10     (10) and connects on the other side to a side of the mould part (2,3) remote from the  
mould cavity (10),  
characterised in that the suction runner (9) takes a multiple form that connects  
to a number of apertures (8) in the wall of a lower mould part (3) on positions (8)  
opposite the recess (14) in the upper mould part (2).
- 15     2.     Mould (1) as claimed in claim 1, characterised in that a plurality of suction  
runners (9) connecting onto the wall defining the mould cavity (10) are in mutual  
communication and are connected to a single runner (13) which connects onto a side  
of the lower mould part (3) remote from the mould cavity (10).
- 20     3.     Mould (1) as claimed in claim 1 or 2, characterised in that the runner (9)  
debouches in a wall defining a mould cavity (10), which wall is screened from a feed  
opening for encapsulating material by a carrier when encapsulating material is fed to  
the mould (1).
- 25     4.     Mould (1) as claimed in any of the foregoing claims, characterised in that  
the apertures (8) are arranged in the wall of a lower mould part (3) in patterns.
- 30     5.     Mould (1) as claimed in any of the foregoing claims, characterised in that  
the lower mould part (3) is provided with at least one aligning edge for positioning a  
carrier relative to the lower mould part (3).

10-07-2000

M 10.07.00

8 Amended application PCT/NL99/00424  
as filed with letter dated July 7, 2000

6. Encapsulating device for encapsulating electronic components mounted on a carrier, comprising:

- a mould (1) as claimed in any of the foregoing claims,
- drive means for positioning and causing the mould parts (2,3) to move relative to each other,
- feed means for encapsulating material, and
- a fan connecting onto the side of the runner (9) remote from the mould cavity (10), characterised in that the fan is adapted to blow gases into the runner (9) and to extract gases from the runner (9).

7. Method for encapsulating electronic components mounted on a carrier, comprising the steps of:

- A) positioning at least one carrier relative to a lower mould part (3),
- C) closing a mould (1) by moving the lower mould part (3) and an upper mould part (2) towards each other,
- D) feeding encapsulating material to the part of the mould cavity (10) left clear by the carrier, and
- D) opening the mould halves (2,3) and removing the carrier with encapsulating material arranged thereon, wherein during step D) an overpressure is applied in a runner (9) connecting onto a wall co-defining the mould cavity (10), which overpressure releases the encapsulated electronic components from the lower mould part (3).

8. Method for encapsulating electronic components according claim 7, characterised in that after step A) during a step B) an underpressure is applied in the runner (9), whereby the carrier is sucked to lower mould part (3).



PCT

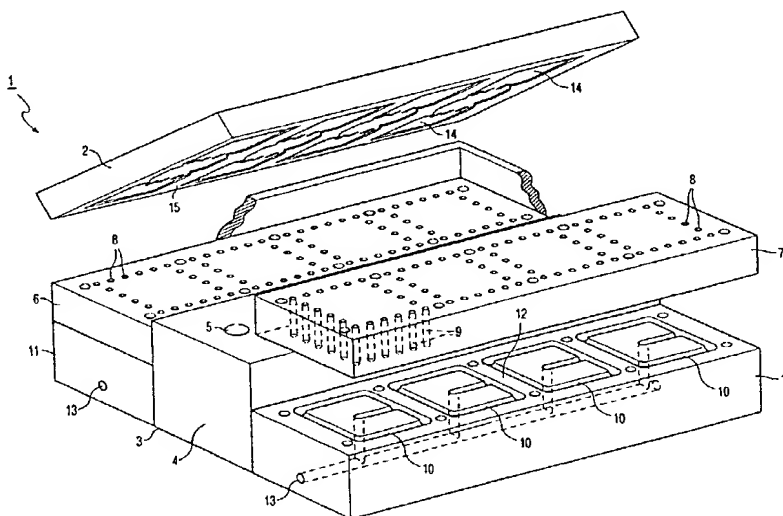
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International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>7</sup> : <b>H01L 21/56</b>	<b>A1</b>	(11) International Publication Number: <b>WO 00/02242</b> (43) International Publication Date: 13 January 2000 (13.01.00)
<p>(21) International Application Number: PCT/NL99/00424</p> <p>(22) International Filing Date: 5 July 1999 (05.07.99)</p> <p>(30) Priority Data: 1009563 6 July 1998 (06.07.98) NL</p> <p>(71) Applicant (for all designated States except US): FICO B.V. [NL/NL]; Ratio 6, NL-6921 RW Duiven (NL).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): TOMASSEN, Marcel, Gerardus, Antonius [NL/NL]; Zonégge 16-24, NL-6903 GN Zevenaar (NL). CLAASSEN, Antonius, Bernardus [NL/NL]; Polderdijk 73b, NL-6914 KJ Herwen (NL).</p> <p>(74) Agent: VAN DEN HEUVEL, Henricus, Theodorus; Octrooibu- reau LIOC, P.O. Box 1514, NL-5200 BNs -Hertogenbosch (NL).</p>	<p>(81) Designated States: JP, KR, SG, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report.</i></p>	

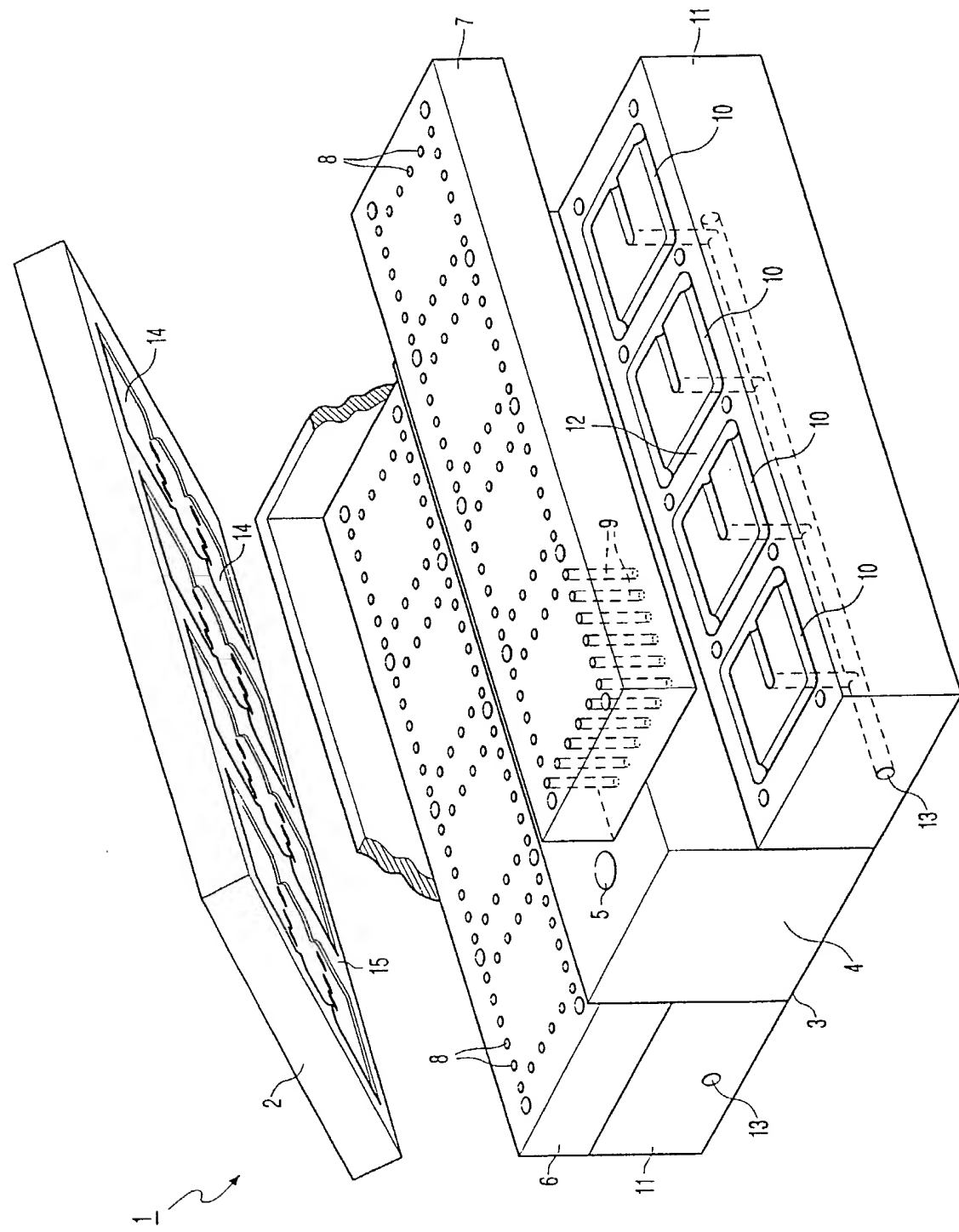
(54) Title: MOULD, ENCAPSULATING DEVICE AND METHOD OF ENCAPSULATION



(57) Abstract

The invention relates to a mould for encapsulating electronic components mounted on a carrier, comprising: at least two mould parts displaceable relative to each other, at least one of which is provided with a recess, and feed means for encapsulating material, wherein at least one of the mould parts is provided with a runner which connects on one side to a wall of a mould part co-defining a mould cavity and connects on the other side to a side of the mould part remote from the mould cavity. The invention also relates to an encapsulating device of which such a mould forms part, and to a method for encapsulating electronic components mounted on a carrier.

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U.S. DEPARTMENT OF COMMERCE

**DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION**  
(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET  
NUMBER

3135-010012

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Mould, encapsulating device and method of encapsulation

the specification of which (check only one item below):

- ☐ is attached hereto
- ☐ was filed as United States application  
Serial No. \_\_\_\_\_  
on \_\_\_\_\_  
and was amended  
on \_\_\_\_\_ (if applicable).
- ☒ was filed as PCT international application Number PCT/NL99/00424  
on 05 July 1999  
and was amended under PCT Article 19  
on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United State code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

**PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:**

COUNTRY (of PCT indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
NL	1009563	06 July 1998 (06.07.98)	<input checked="" type="checkbox"/> YES NO
			<input type="checkbox"/> YES NO
			<input type="checkbox"/> YES NO

PTO 1391 (rev 10/83)

Page 1 of 2

US DEPARTMENT OF COMMERCE Patent and Trademark Office

(Combined Declaration For Patent Application and Power of Attorney --PTO 1391 [13-11]--page 1 of 2)

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONTINUED) (Includes Reference to PCT International Applications)				ATTORNEY DOCKET NUMBER																																											
<p>I hereby claim the benefit under Title 35, United States Code, §120, of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.</p>																																															
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<p><b>POWER OF ATTORNEY:</b> As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:20%;">William H. Logsdon</td> <td style="width:10%;">22,132</td> <td style="width:20%;">Paul M. Reznick</td> <td style="width:10%;">33,059</td> <td style="width:20%;">Jesse A. Hirshman</td> <td style="width:10%;">40,016</td> </tr> <tr> <td>Russell D. Orkin</td> <td>25,363</td> <td>John W. McIlvaine</td> <td>34,219</td> <td>James G. Porcelli</td> <td>33,757</td> </tr> <tr> <td>David C. Hanson</td> <td>23,024</td> <td>Michael I. Shamos</td> <td>30,424</td> <td>Kent E. Baldauf, Jr</td> <td>36,082</td> </tr> <tr> <td>Frederick B. Ziesenheim</td> <td>19,438</td> <td>Blynn L. Shideler</td> <td>35,034</td> <td>Christian E. Schuster</td> <td>43,908</td> </tr> <tr> <td>Richard L. Byrne</td> <td>28,498</td> <td>Julie W. Meder</td> <td>36,216</td> <td>Deborah M. Altman</td> <td>42,259</td> </tr> <tr> <td>Kent E. Baldauf</td> <td>25,826</td> <td>Lester N. Fortney</td> <td>38,141</td> <td>Thomas Clinton</td> <td>40,561</td> </tr> <tr> <td>Barbara E. Johnson</td> <td>31,198</td> <td>Randall A. Notzen</td> <td>36,882</td> <td>Dean E. Geibel</td> <td>42,570</td> </tr> </table>						William H. Logsdon	22,132	Paul M. Reznick	33,059	Jesse A. Hirshman	40,016	Russell D. Orkin	25,363	John W. McIlvaine	34,219	James G. Porcelli	33,757	David C. Hanson	23,024	Michael I. Shamos	30,424	Kent E. Baldauf, Jr	36,082	Frederick B. Ziesenheim	19,438	Blynn L. Shideler	35,034	Christian E. Schuster	43,908	Richard L. Byrne	28,498	Julie W. Meder	36,216	Deborah M. Altman	42,259	Kent E. Baldauf	25,826	Lester N. Fortney	38,141	Thomas Clinton	40,561	Barbara E. Johnson	31,198	Randall A. Notzen	36,882	Dean E. Geibel	42,570
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Send Correspondence to: John W. McIlvaine, 700 Koppers Building, 436 Seventh Avenue, Pittsburgh PA 15219-1818				Direct Telephone Calls to: (name and telephone number) John W. McIlvaine (412) 471-8815																																											
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<p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statement may jeopardize the validity of the application or any patent issuing thereon.</p>																																															
<p><u>Marcel Gerardus Antonius TOMASSEN</u> Date: 31-1-01</p>			<p><u>Antonius Bernardus CLAASSEN</u> Date: 31-JAN-2001</p>																																												